

Timely Salvage Initiative (Sustainability Phase): Reduce Time to Intervention for Patients Admitted for Malfunctioning Vascular Access (AVF)

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Mission Statement

To increase the proportion of inpatients who get fistula salvage within 48 hours from 0% to 50% (stretch goal 70%) over a sustained period

Patients / Sites: All TTSH patients admitted for failing / thrombosed AV (arteriovenous) access
Measure: Time in hours from presentation time at Emergency Department → time to first of intervention [either in Interventional Radiology (IR) Suite / Invasive Cardiac Lab (ICL) / Operating Theatre (OT)]

Team Members

| | Name | Designation | Department |
|--------------|--------------------------------|------------------------------|----------------------|
| Team Leaders | Dr Yong Enming | Consultant | General Surgery |
| | Dr Justin Kwan | Senior Consultant | Diagnostic Radiology |
| Team Members | Dr Zhang Li | Senior Resident Physician | General Surgery |
| | Ms Zhou Xueping | Senior Vascular Technologist | General Surgery |
| | Ms Diomampo Elah Katriz Abanto | Senior Staff Nurse | Operating Theatre |
| | Ms Joana Marie Eugenio Gray | Senior Radiographer | Radiography Service |
| | Ms Neo Shufen | Senior Coordinator | General Surgery |

Sponsors:

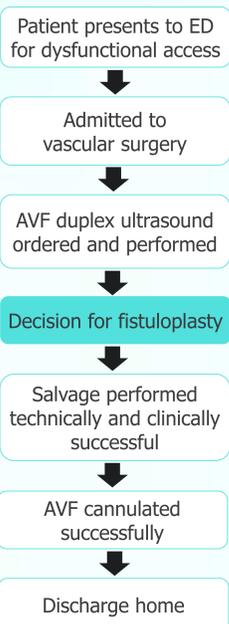
- Adj A/Prof Glenn Tan Wei Leong (Head of Department, General Surgery)
- Adj A/Prof Pua Uei (Senior Consultant, Diagnostic Radiology)

Evidence for a Problem Worth Solving

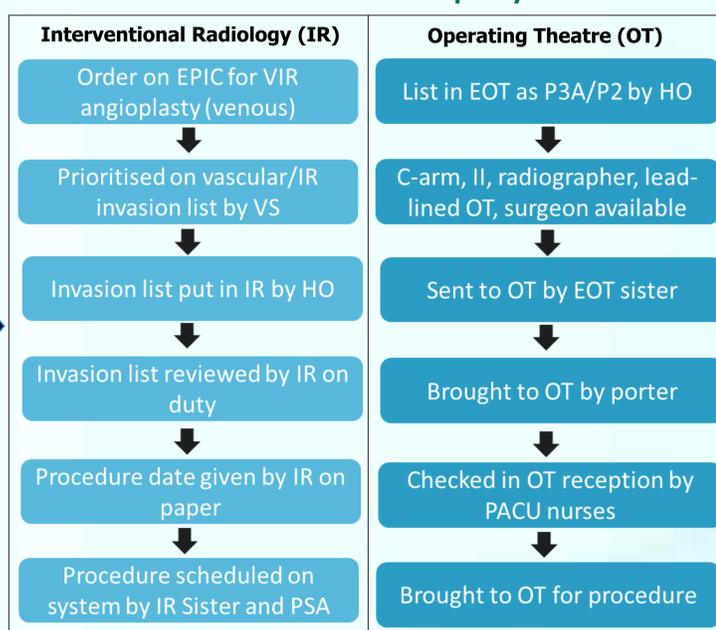
| Literature | Extracted Contents | Impact of Delay |
|---|---|---|
| National Kidney Foundation (NKF) KDOQI Clinical Practice Guidelines (CPG) (Update 2019) | Thrombectomy should be performed in a timely fashion relative to event given the pathophysiology of the thrombotic process and inflammatory response. Early thrombectomy has better long term results in terms of primary assisted patency of the fistula circuit. | LESS NEED FOR TEMPORARY OR TUNNELED CVC INSERTION Early salvage minimises and eliminates the need for dialysis with temporary or permanent tunneled catheter ; less risk for associated complications: central vein stenosis or infection. |
| EBPG (European Best Practice Guidelines 2007) On Vascular Access | Fistula thrombosis should be treated as soon as possible or within 48 hours . The duration and site of AV fistula thrombosis as well as the type of access are important determinants of treatment outcome. | DELAY CAN MAKE INTERVENTION MORE CHALLENGING Delay in treatment may result in extension of the thrombus, making intervention or surgical procedures more difficult and less successful . |

Flow Chart of Process

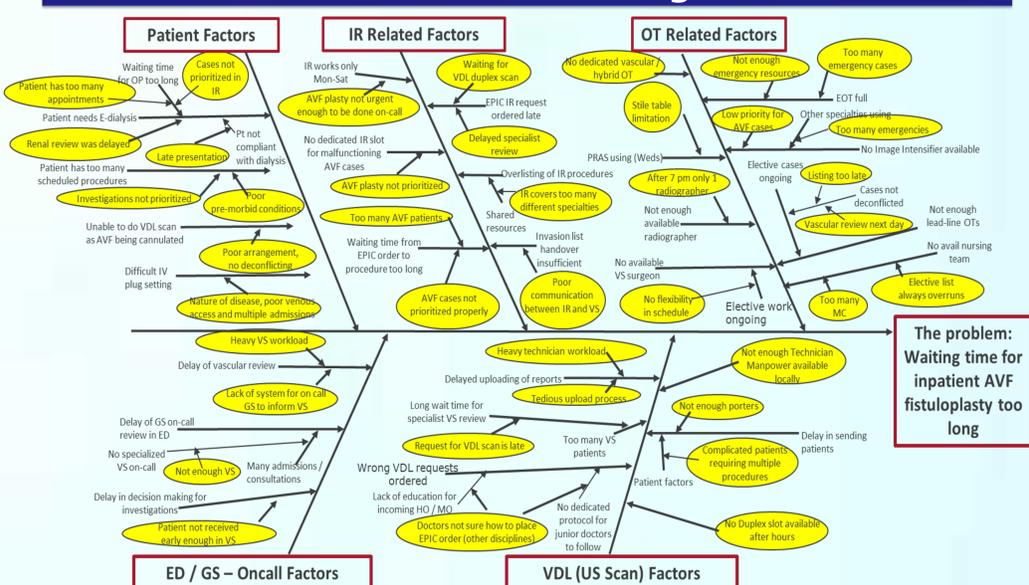
MACRO FLOW



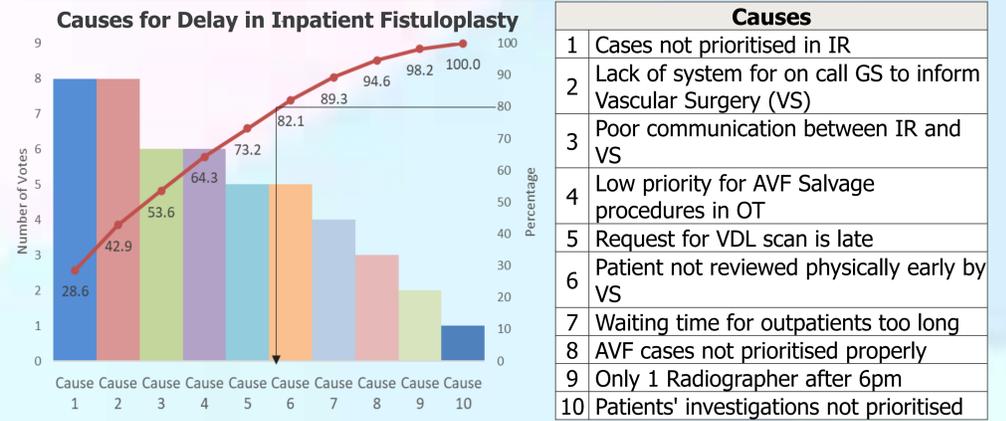
MICRO FLOW of Fistuloplasty in



Cause and Effect Diagram



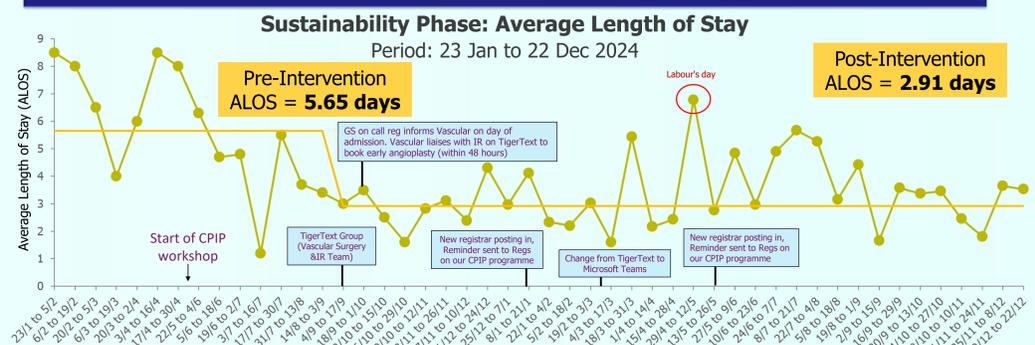
Pareto Chart



Implementation

| Root Cause | Intervention | Implementation Date |
|---|---|---------------------|
| Cause 1: Cases not prioritised in IR | TigerText (TT) / Teams group with Vascular Surgery, IR and IR sister to facilitate communication | 4 Sep 2023 |
| Cause 3: Poor communication between IR and VS (overlap but different causes) | GS on call registrar informs Vascular on day of admission. Vascular liaises with IR on TT to book early angioplasty (within 48 hours) | 18 Sep 2023 |

Results



| Year | 2023 | 2024 |
|---------------------|------|------|
| # Salvaged | 6 | 11 |
| # Salvaged < 48 Hrs | 0 | 10 |
| ALOS (Days) | 8.5 | 3.5 |

Cost Savings

| | Pre-Intervention | Post-Intervention |
|---|------------------|---|
| Average Length of Stay (Per Patient) | 7 days* | 3 days |
| Average Length of Stay Saved (Per Patient) | | 3 - 7 = -4 days |
| Cost of Inpatient Stay (Per Patient) | = \$7,322 | = \$3,138 |
| FC insertion rate (Per Patient) | 0.8 | 0.076 |
| FC insertions reduced (Per Patient) | | 0.076 - 0.8 = -0.72 insertions |
| Cost of FC insertion (Per Patient) | = \$340 | \$32 |
| Cost Savings (Per Patient) | | \$3,138 - \$7,322 + \$32 - \$340 = -\$4492 |
| Assume No. of Patients requiring AVF salvage per year = 151 (annualised as 64 required salvage over 22 weeks) | | |
| Total Length of Stay Saved (Annualized) | | -4 days x 151 = -604 days |
| Cost Savings (Annualized) | | -\$4492 x 151 = -\$678,292 |

Note:

Unit Cost for Inpatient Stay Per Day Per Patient = \$1,046 & Unit Cost per Femoral catheter insertion per Patient = \$425
*Data from 2020: Lim C, Kwan J, Lo ZJ, et al. Single-centre experience with endovascular rotational thrombectomy for single session salvage of thrombosed arteriovenous fistulas and grafts. J Vasc Access. 2021 Nov 29

Problems Encountered

- Need to continue to work on solutions for patients coming in on Friday and the weekend (ie. weekend effect)

Strategies to Sustain

- New workflow
- Continue to implement the 2 interventions

Lessons Learnt

- Problem was not due to a lack of resources but due to a need to prioritise with IR
 - Able to do so by setting up TigerText/Teams group with IR and IR sister with Vascular
 - Invasion list workflow optimised
- Dysfunctional access patients only had decision on intervention the day after admission leading to delays
 - We brought decision forward by getting on call GS to inform vascular on call on day of admission. This will be incorporated long term.